Center for Advanced Computing: Services

Empowering Researchers to Tackle Complex AI/ML and Data-Intensive Computing Challenges

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AI/ML Computing Services

• Facilitate access to and scaling on a range of computing resources
  – Red Cloud - more than 3,000 CPUs plus NVIDIA H100, T4, V100, and A100 GPUs
  – Public clouds
  – National computing resources

• Architect, build and maintain HPC Clusters (CPUs & GPUs)
  – Customize to faculty needs

• Provide data storage solutions and data management tools
  – Ceph, AWS S3 object store, archival storage

• Enable AI/ML preparation and data processing on Red Cloud (CPUs & GPUs)
  – Ex/ Shuibing Chen Lab - ML Model to Study Key Factors in Controlling Gut Development
    • Lab develops on Red Cloud (including TensorFlow and PyTorch library testing), then scales to Cayuga Cluster
    • Likes the fact that Red Cloud is self-administered, so they can install and configure as they like
AI/ML Consulting Services

• AI consulting we support or enable
  – Provisioning instances
  – Preprocessing, Extract Transform Load (ETL), data ingestion
  – Scaling with on-premise hardware or to public clouds (A to Z fast start)
  – Drafting GPU time grant applications for NSF resources: Frontera, Jetstream2, and more
  – Building servers, containers, and library environments
    • TensorFlow, PyTorch, Keras, John Snow Labs (JSL Healthcare AI), etc.
  – Fine-tuning local and publicly-hosted LLMs
  – Visualizing data
    • TensorBoard
    • Bokeh, Plotly, Matplotlib
  – Sharing with and between research groups with Colab, a Jupyter Notebook service
AI/ML Project Examples

**AI in Veterinary Medicine** – Parminder Basran has a keen interest in ML methods in radiation oncology. CAC prepared scripts and demoed how MATLAB Parallel Computing Toolbox works on a local machine and Red Cloud, and provided workflow integration advice.

**ML in Chemistry & Chemical Biology** – Robert A. DiStasio, Jr. runs simulations and ML on molecular properties and chemical reactions using the POOL Cluster built and maintained by CAC.

**ML at Dyson** – Matt Marx uses CAC systems to link patents to academic articles to understand the scientific heritage of innovation. Hand-tuned heuristics and the GROBID ML package were combined to achieve higher performance than ML alone.
AI/ML Training, Grants, Proposal Development

• Scientific Computing Training Series webinars
  – “AI, Machine Learning, and Deep Learning with Python”
  – “How Research Hospitals Are Using Deep Learning and Generative AI”
    • Demoed brain MRI tumor segmentation and hospital admission for diabetes prediction

• Cornell Virtual Workshops
  – “AI with Deep Learning” and “Python for Data Science”

• YouTube Channel (1,200 subscribers), eCornell Certificates, workshops, guest lectures

• Select grants
  – Chishiki.ai - building an AI Tutor to deliver scalable learning to the Civil Engineering community (Co-PI)
  – HPC-ED Pilot - building a platform for discovering and sharing training and ed materials nationally (PI)
  – Leadership-Class Computing Facility - selected as the training partner for NSF’s largest supercomputer (’25)

• Proposal development services
  – Strategy sessions, SWOT analysis, proposal writing/editing, data management plans
This presentation and the CAC AI/ML Services poster are available at https://www.cac.cornell.edu/technologies/aiml.aspx